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Therapy

OF THE

Glycero- phosphates

WITH SPECIAL REFERENCE TO

Elixir

Glycerophosphates

OF

SODA AND LIME—Wyeth

JOHN WYETH & BROTHER

INCORPORATED

PHILADELPHIA, PA.

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Therapy of the Glycerophosphates with Special Reference to the Elixir of Glycerophosphates of Soda and Lime—Wyeth.

The phosphates, embracing the more recently exploited glycerophosphates, are among the most important, both in number of uses and complexity of composition, of all the drugs preferably employed for the purpose of "building up" the human organism. That this should be their chief use is natural, for the phosphates are normally found in the body in all its solid and viscous portions—in the bones, nerves, internal organs and blood.

As these groups of salts are somewhat different as regards their action on the economy, it is best, for the sake of clearness, to consider them separately.

The alkaline phosphates, whose rôle in therapeutics up to the present day has been inconsiderable, have, nevertheless, long been known as exercising in the organism a variety of important chemical and physiological functions. In the blood, for instance, they exercise, by alternation, the same functions as the alkaline carbonates, whose place they may take under certain circumstances; that is, both phosphoric and carbonic acids, though very different as acids, form compounds with the alkalis of the blood of precisely similar properties, chemically and physiologically. The importance of this alternation

to the nutrition of the body, as well as its fundamental character, is well described in the following quotation :

“This” (*i. e.* the alternation referred to) “permits us to understand why man can nourish himself either on a diet composed exclusively of animal food or exclusively of vegetables, or on both together, without experiencing a change in the normal properties of blood and humors. If he is fed entirely on meat—which reduced by oxidation, as is known, contains only phosphates and no carbonates—the phosphates predominate in the blood ; if, on the other hand, his food consists exclusively of vegetables, it is observed that the blood begins to assume the composition peculiar to that of the herbivorous animals..” In other words, after an exclusively vegetable diet, the blood eventually contains a small proportion of phosphates as compared to carbonates.

The difference is important, for the phosphates, or phosphorus, finally are of much greater value in the processes of growth and nutrition than the carbonates. Phosphorus, we are told, acts upon the primary elements of the body, the cells, endowing them, according to Binz, “with new vitality when their powers are diminished,” a property that it has in common with iron and arsenic, but in greater degree.

Phosphorus is a necessary factor in cellular growth or division ; it exists always in the nucleus of the young reproductive cells, and their power of reproduction, and consequently the power of growth of the organism, diminish in proportion as the amount of phosphorus diminishes.

That the phosphates should exercise tonic and nutritive effects is due, no doubt, chiefly to their containing phosphorus, but also, in part, to a transformation, slight but material, that they undergo in the blood and cells. In the blood they remain as basic neutral phosphates, in the cells as acid salts, usually in combination with potassium. According to the best authorities,

the modicum of phosphates required by the body is procured from foods, most of which contain these salts in sufficient proportion; yet it is known, too, that a proportion of phosphates is formed in the economy itself, and probably utilized for its own needs, by the reaction that goes on between phosphate of potassium and chloride of sodium wherever these two salts are brought into union. But, however formed, whether within or without the body, their effects are the same.

As a remedy the phosphate of sodium is safe and pleasant and can be given in considerable doses—two to three drachms. Its purgative action is unaccompanied by colicky pains. In Diabetes it is useful; but it is in such diseases as Debility, Impotence, Locomotor Ataxia and allied conditions of organic weakness that its powers, for the reasons already mentioned, are so signally displayed. Its action on the liver and biliary secretions has suggested its use in Catarrhal Jaundice and in Gall-Stones, and brilliant cures have been effected by it in those maladies, for which it appears to be a remedy of almost certain efficacy.

The most important of the earthy phosphates are the phosphates of lime and magnesium. They are normally found in the organism, and while they exist likewise in the blood and tissues, where they exercise the same functions as the alkaline salts, their chief use seems to be in the formation of bone. In one thousand grammes of human bone five hundred and seventy grammes of phosphate of lime are found, and from ten to twelve grammes of phosphate of magnesium. To these salts bone owes its solidity; and as the amount required for this purpose is drawn principally from the food we eat, it is evident that the diet must be sufficiently rich in these phosphates or that they must be artificially supplied. It happens with an ordinary diet that about as great a quantity of phosphates is excreted as is taken in with the food; but the balance

is largely increased in their favor by the reaction that has previously been described between the alkaline phosphates and the carbonates of the first group of metals—sodium, potassium and lithium. In explanation of this it must be remembered that the distinction made between the phosphates, earthy and alkaline, does not hold good in the body, an exchange of considerable magnitude taking place between them. Thus in the stomach the earthy phosphates are in large part decomposed by the gastric juice, acid phosphates and chloride of sodium being the result. It was, indeed, for a long time disputed whether any portion of the earthy phosphates—the phosphate of calcium, for instance—was absorbed unchanged by the blood. Recent researches of Neubauer and Riesell have shown that a considerable part of these phosphates is absorbed intact, but larger doses are necessary to effect this and absorption is slow and difficult.

If the absorption of the earthy phosphates did not take place, it would be difficult to explain the rapidity and completeness with which fractures mend, when a course of these salts is given; it would be difficult, likewise, to explain their curative effects in Rickets and Osteomalacia, diseases for which they are peculiarly designed. Such results undoubtedly show, whatever theories may be advanced to explain them, the fundamental importance of the phosphates of calcium and magnesium in the alimentation of bone and of the entire organism.

In this field, as remedies in nervous and general debility, the phosphates are all of immense utility; all, in whatever form given, contribute phosphorus, an essential constituent of nerve tissue, to the nervous system. In that troublesome and too frequent disease of modern life, Neurasthenia, a disease characterized probably by an inadequate provision of phosphates in the nerves, they are especially valuable, whether

the malady results from overwork, worry, town life or any other of its multitudinous causes. In such cases the phosphates have come to be considered indispensable, for they alone of the constituents of nervous tissue attract thither oxygen and the nutriments in the blood current, oxygen being by far the most important, without which the life of cells and tissues, both nervous and muscular, must languish and be extinguished.

In Paralysis, the phosphates have accomplished excellent results. Their efficacy here is probably due to their nutritive effects upon the nerve cells. For this purpose the glycerophosphates have been brought forward recently by Robin and others. From all accounts they are safe and agreeable remedies, being almost completely absorbed by the organism. Robin has published some striking results with the glycerophosphates in Neurasthenia, Nervous Depression, Convalescence from Grippe, Chlorosis and Albuminuria. In the maladies of old age, in Impotence, etc., he prefers these salts to the testicular juice, whose power in these cases is due to the phosphorus it contains.

In the future the glycerophosphates are destined to play an important rôle in medicine. It is possible even now to sketch their future ; for, considering their far-reaching effects on the nutrition of the body, we may predict with confidence that these salts must be resorted to in cases where the nutrition has in some degree failed owing to the excessive elimination from the body of phosphorus. This excessive excretion, as is well known, takes place in all conditions of fatigue and weakness, at the end of acute and during chronic diseases, in fevers, in the later stages of phthisis, in all diseases of the nervous system consequent upon strenuous efforts of body and mind.

The recent enthusiastic exploitation of the administration of glycerophosphates subcutaneously, although supported by

good authorities, is not, we are convinced, the most efficient method for the administration of these remedies. Whilst in this way the most ready means of reaching the nervous apparatus is secured, and the direct stimulating effects obtained, we are confident that the internal use is far more efficient in the great majority of cases known as neurasthenic, in chronic wasting diseases and in the prematurely old who are declining in physical and mental activity at a period when they should be in possession of all their powers. In the effort at reconstruction the element of time becomes important. The materials needed in the restoration of the debilitated nerve tissue must be furnished through the ordinary sources of supply, must enter the blood through the agency of primary and secondary assimilation. To inject the phosphates, therefore, may supply the needs of the emergency, but it is by the patient and continuous supply of the remedy through the agency of the organs of assimilation that real and permanent additions to the nervous matter can be secured ; and we have therefore prepared and commend to the attention of physicians an Elixir Glycerophosphates of Soda and Lime in which these salts are presented permanently in solution in a form best adapted for their ready assimilation, and at the same time palatable and easy of administration.

By consultation with some of the most eminent therapeutists of our day, experienced in the administration of these salts both in hospital and private practice, we have obtained the data on which may be properly based the use of the glycerophosphates in the large and apparently growing class of nervous invalids. Guided by the experience of these eminent authorities, we suggest the administration of the glycerophosphates for a sufficient time and in proper quantity to correct structural changes and secure proper assimilation of the materials of nerve nutrition in all chronic wasting diseases,

in the premature advance of age and in the various forms of nervous debility. To obtain the best results, all the aids that can be afforded by appropriate hygiene must be put into active operation. Alcoholic and vinous stimulants and fermented liquors should be renounced, tobacco in all its forms reduced to the minimum, if not wholly given up, coffee and tea used only occasionally, and excesses of all kinds cease. By taking proper physiological exercise in walking, or by such special methods as experience has shown to be most useful, and by spending as much time in the open air as the exigencies of business or social life permit, the best results may be obtained.

Besides the aids thus afforded to the action of the glycerophosphates, certain remedies may be given for a time to contribute to the restoration of the nervous system. We advise that strychnine be prescribed during the course of the phosphates at certain intervals—for example, one-fortieth grain of strychnine to be administered night and morning for a week or two in every month of the time during the administration of the glycerophosphates.

We invite the attention of physicians to

ELIXIR GLYCEROPHOSPHATES SODA AND LIME-WYETH

EACH FLUIDOUNCE CONTAINING :

Soda Glycerophosphate	.	.	.	8 grains
Lime Glycerophosphate	.	.	.	4 grains

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